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ACME  
ALCULATION  
COURSE

IPPENSTIEL





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THE ACME  
Rapid Calculation  
Course

BY  
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## INTRODUCTION

THE ACME RAPID CALCULATION COURSE is a scientific arrangement of all the basic principles of addition, subtraction, multiplication, and division, into exercises for practice, to be used as a complete and essential supplement to arithmetic and not as a substitute for the elementary textbook which teaches the fundamental rules and science of arithmetic; nor for the work giving rules or suggestions for short cuts in figuring, of which there are many excellent methods explained in numerous textbooks and treatises on mathematics. Therefore, before beginning this course, it is necessary that the person knows *how* to add, subtract, multiply, and divide.

This course is SCIENTIFIC because it shows how to reach the desired attainment of rapid and accurate calculation by the best known, quickest, and easiest way.

The purpose of this course is to present a very simple and practical method whereby anyone, by the required effort, can acquire or further develop his or her ability to calculate rapidly and accurately; and eventually all figure work will become an easy and pleasant task, and at the same time be done rapidly and accurately.

Many pupils of the higher grades in school, students in college, and particularly those who have gone out from school to work, know how to add, subtract, multiply, and divide, but are slow and inaccurate in their figure work. This is due principally to the lack of sufficient practice along lines that would develop their ability to a greater degree of rapidity and accuracy in their calculations.

The fact that one must count on his fingers, or take his eyes off the figures and think hard, when adding, subtracting, multiplying, or dividing, is sufficient evidence that one is not familiar with the combinations over which he hesitates.

This is just what this course intends to help overcome.

Many persons have wished for a simple, short, and efficient method that would help them attain this much desired ability, and **THE ACME RAPID CALCULATION COURSE** adequately fills this need. It can be used in the classroom and at home with remarkable success, and the matured business man or woman will find this additional training of great benefit.

The ability to be expert with figures is invaluable to the stenographer, clerk, bookkeeper, accountant, business manager, commercial executive, merchant, and any other person who is engaged in figure work. The person who daily adds incorrectly, slowly, and laboriously, small columns of figures in his or her work, will not find any help for this inefficiency in higher mathematics, but rather in a thorough familiarity with all basic forms of combinations entering into the four fundamental functions of arithmetic.

In all calculations, whether involving

addition, subtraction, multiplication, or division, the result of the combination of certain specific figures is always the same; for instance, 7 plus 9 always equals 16, 8 minus 3 always equals 5, 4 times 11 always equals 44, 12 divided by 6 always equals 2. One digit or several figures standing alone represent that quantity only and at least two digits are necessary to cause a computation in any one of the four processes. All the possible combinations that can be made with any two of the 9 digits and the cipher, form the first computations or basic combinations, with or from which all further calculations are progressively continued. The term "basic combinations" as used in this course will be understood to mean, in practically every instance, all the possible fundamental combinations that can be formed with the digits, and on which all further combinations of the respective processes are based.

These basic combinations may either be found by themselves, or enter somewhere in the working out of a complex

problem, including several or a large number of combinations of one or all of the four processes. They have been the same since the invention of arithmetic, and will always be the same, as the science of arithmetic is an exact science.

Therefore, a thorough familiarity with all the various basic combinations of the processes of addition, subtraction, multiplication, and division, which enter into the working out of practical arithmetical problems, is the first step to accurate and rapid calculation, the attainment of which will be realized only through constant, systematic, and thorough practice, or systematic experience, as practice might be termed.

The most efficient ability in handling figures, as well as in anything that is acquired, is gained only through experience; that is, in the actual doing of the thing to be attained, and while your regular work or school problems will furnish you with practical experience, it is needless to say that if your experience is supplemented by the practice of



systematically arranged exercises which cover all basic forms of combinations you will ever meet, the result of your experience naturally will be of the highest development obtained through a minimum amount of effort.

The method used in this course is new only in that all the basic combinations which are possible, and upon which all progressive calculations are based, are systematically grouped into exercises for practice.

The few exercises of the course will perhaps at once appear very simple and almost ridiculous for constant practice, yet they are of the most vital importance; although their simplicity is one of the main features of the course. Further, the course is short and the practice is confined to a minimum number of exercises, representing all the possible basic combinations rather than to a large number of varied exercises containing frequent repetitions, and, therefore, it is not burdened with anything that is not absolutely essential.



## GENERAL SUGGESTIONS

Emphasize constantly to yourself, "I W-I-L-L acquire the ability to calculate rapidly and accurately," and then with determination to succeed; practice, PRACTICE, P R A C T I C E — systematically, constantly, faithfully, and patiently, until the goal is won.

In this course there are no complex problems to solve. All you need to do is sit down and practice systematically as suggested. The explanations and the exercises are simple, and free from technicalities, so that both young and old can readily understand them.

Let your practice be systematic; set a time when it is most convenient for you each day to give at least fifteen minutes to practicing the exercises. A few minutes of systematic practice daily will do more good than an hour or longer occasionally.

Take only a few combinations at a time, only a small portion of an exercise

if necessary, and do not attempt to hurry through the course. Review each day.

First, **BE ACCURATE**. Rapidity will come through practice. Practice getting the results of the combinations until you can do so **AT A GLANCE**. This may call for the exercise of your patience, but the attainment of the goal will justify your practicing a long time if necessary.

While several months' faithful practice should show considerable development, and probably be sufficient for the already rapid and accurate calculator, no limit should be set upon the length of time but rather continue systematically and faithfully practicing until your ability to add, subtract, multiply, and divide rapidly and accurately with ease is developed to the highest possible degree.

It seems rather astonishing, but nevertheless it has been proven to be true; that those who calculate very rapidly are likewise accurate.

It is advisable to use short cuts in all figure work whenever practicable, but **DO NOT** use any short method in the

practice of any of these exercises, as the use of any short cut method will defeat the purpose of this course, and the practice of the exercises will not give you the result desired. Finish the course as prescribed and then take up the practice of essential short cuts.

The combinations in the respective exercises are not all consecutively arranged nor are all the answers to the same given. This is purposely done for the student's entire benefit. Therefore, do not write any answer under any combination in the exercises. If it is necessary—and perhaps for some it may be better at first—copy the combinations on a separate sheet of paper with the correct answer, and you will be aided in getting the result, which is of first importance. Later, discard this sheet and use the exercises without the written answers.

Learn to know the figures of a basic combination just as you know the letters of a word, so that the instant you either see the figures of the combination, mentally picture them, or hear them, you can

give the correct result, in like manner as you immediately know a word by the letters that form it. In other words, the instant you see, picture, or hear the figures of a combination, they should immediately represent to you in the respective processes; the sum, the remainder, the product, or the quotient.

However, your ability in handling figures will not be fully developed if you only practice the combinations as you see them. Learn to visualize or form a mental picture of each basic combination with the result of same, without looking at the printed figures. In order to strengthen and fully develop this faculty it is important that you get someone to read to you occasionally the various combinations, and as each combination is mentioned to you, slowly at first, immediately give the correct answer, mentally picturing the figures and the answer of the combination. Also, if a blackboard is available—it will be in the classroom—have a number of combinations written on the board and then

have your assistant or the instructor point to the combinations at random while you endeavor to give the answers rapidly and accurately. Practice in this manner until you can give the answers almost as fast as your assistant can read them to you, or point to them. (In classroom work it is expected that instructors will realize the necessity of this practice and will see to it that the pupil receives the required oral and blackboard work.)

Insist that your assistant, when reading the combinations to you, skips about from one combination to another instead of following the order given in the exercise, increasing the speed as your ability to give results quickly and correctly develops.

Take the course with you; or copy an exercise or portion of it on a card, and carry this in your pocket for practice during your spare moments, such as when riding to and from school or the office.

Finally, as mentioned before, do not hurry through the course. Above all, be systematic and accurate, and practice

only with a reasonable number of combinations in the time you set aside or have available for practice, giving some time each day to review. Do not think you are wasting time in practicing these exercises for a year if necessary, for the accomplishment of a remarkable accuracy and rapidity in handling figures will amply repay you for the application of your time and energy. Also remember that a few minutes practice each day will benefit you much more than a long time spent in practicing occasionally.



## LESSON I

---

### ADDITION

TERMS	{	8 Addend
		4 Addend
		—
		12 Sum or Amount

The process of addition is used more in business than the other three processes combined and for this reason more attention is given to it.

All the possible two figure combinations of the digits for addition are formed by adding each digit and the cipher to itself, and each digit to each of the other eight digits and the cipher, making 45 combinations without the cipher and 55 with the cipher. As these are the first combinations that can be formed with the digits for addition, and with which all further combinations of addition are formed, let us term these “basic combinations.”



EXERCISE No. 1—Continued

7	4	2	3	9	0	4	3	1	0
<u>7</u>	<u>4</u>	<u>6</u>	<u>5</u>	<u>5</u>	<u>6</u>	<u>6</u>	<u>7</u>	<u>7</u>	<u>0</u>
1	2	4	5	0	1	6	5	3	2
<u>9</u>	<u>8</u>	<u>8</u>	<u>7</u>	<u>4</u>	<u>4</u>	<u>8</u>	<u>9</u>	<u>9</u>	<u>0</u>
3	4	6	7	2	9	8	7	5	4
<u>1</u>	<u>0</u>	<u>0</u>	<u>9</u>	<u>5</u>	<u>9</u>	<u>0</u>	<u>1</u>	<u>1</u>	<u>2</u>
5	6	8	9	1	2	0	9	7	6
<u>3</u>	<u>2</u>	<u>2</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>2</u>	<u>3</u>	<u>3</u>	<u>4</u>

## LESSON II

---

### ADDITION—Continued

When you add a long column of figures, the combinations are a progression of those you practiced in Lesson One, and when you have added to 100 or over, and the column is still longer, you bear the 100 “in mind” and continue adding, as though you started over again, until 200 is reached, when you bear the 200 “in mind,” and continue adding in this manner.

Naturally all the combinations that enter into this advanced process of addition are each of the digits and the cipher added to each of the figures from 1 to 99. These combinations are all included in the columns in Exercise “2.” These columns are to be added not only once or twice, but again and again (several hundred times if necessary) as the oftener you add them the more familiar you will

become with all the possible combinations that enter into the adding of columns of figures, and consequently you will become more rapid and accurate.

The following columns, therefore, contain all the possible combinations, with the exception of those with the cipher, that you will ever come in contact with in the adding of any column of figures, following the plan of adding to a sum of 100 or over, and while bearing the 100 "in mind," continue adding as if it were a separate column; that is, by starting over again with 1 or whatever figure it happened to be after temporarily taking off the hundreds.

THESE COLUMNS CONTAIN EACH OF THE ESSENTIAL COMBINATIONS AND, THEREFORE, GIVE YOU THE MAXIMUM AMOUNT OF BENEFIT FROM A MINIMUM AMOUNT OF PRACTICE.

Add these columns both UPWARD AND DOWNWARD as they must be added in both directions in order to get the practice of all the possible combinations.

## EXERCISE No. 2

9	1	2	8	6	5	1	7	2	3	7	4
1	4	8	9	8	6	6	2	1	6	7	9
7	5	2	7	9	8	4	3	7	4	4	3
1	4	7	4	4	2	9	5	1	4	6	6
1	2	8	1	5	4	8	2	2	5	2	8
9	9	8	7	3	4	2	5	6	7	8	9
9	2	2	4	7	2	6	3	1	8	4	1
8	2	9	2	2	2	2	1	3	3	1	3
2	4	4	9	1	5	4	7	6	4	9	4
8	9	2	9	1	2	4	5	5	7	5	6
9	1	1	7	2	7	7	5	9	3	4	5
6	6	8	2	4	5	7	8	8	4	8	2
4	3	4	3	6	7	5	1	4	4	3	1
1	8	1	4	1	1	8	2	1	7	7	8
1	8	5	2	7	3	6	9	6	8	8	7
8	8	1	4	8	2	8	4	3	5	1	1
2	3	1	1	4	7	4	6	6	6	4	3
5	7	2	3	1	5	8	7	8	3	5	7
2	1	9	9	9	9	3	4	5	6	9	3
1	8	1	5	4	2	6	4	8	9	5	6
3	1	8	5	8	2	<u>108</u>	3	4	1	<u>107</u>	2
8	8	4	3	1	9		5	9	<u>107</u>		9
4	5	1	<u>108</u>	7	9		2	2		<u>107</u>	
<u>109</u>	<u>109</u>	8		<u>108</u>	<u>108</u>		4	<u>107</u>			
		3					2				
		<u>109</u>					2				
							<u>108</u>				



EXERCISE No. 2—Continued

5	7	6	2	4	3	1	1	3	2	8
3	5	4	5	5	9	4	5	3	6	6
3	8	3	8	7	6	1	2	5	7	6
5	5	7	6	7	8	9	1	3	2	4
1	6	1	7	9	1	4	5	3	9	7
8	8	6	4	2	6	3	1	6	6	1
3	5	4	6	3	2	6	5	8	9	5
3	5	3	9	4	6	5	6	6	4	7
9	2	5	1	3	2	4	3	5	7	6
8	2	8	3	2	3	6	3	6	9	1
2	9	3	7	6	3	7	8	6	1	5
9	8	5	6	3	9	8	6	9	6	9
3	1	4	7	5	5	7	5	7	6	8
9	4	5	7	9	3	2	8	9	2	7
9	5	1	9	9	3	7	6	3	7	6
3	5	5	5	5	5	6	9	9	9	5
2	7	3	6	7	9	9	5	4	3	4
3	2	1	7	2	8	6	2	8	6	3
7	7	7	<u>105</u>	1	7	<u>9</u>	1	<u>103</u>	<u>1</u>	2
7	2	7		6	4	<u>104</u>	5		<u>102</u>	<u>1</u>
3	3	8		6	2		9			<u>101</u>
<u>1</u>	<u>106</u>	6		<u>105</u>	<u>104</u>		<u>7</u>			
<u>106</u>		<u>4</u>					<u>103</u>			
		<u>106</u>								

While the method of grouping by tens, or by any other short method when adding, is a very good one, as is any short cut in figuring, yet do not use any short cuts in adding these columns as this will spoil the purpose of the exercise and you will not get practice in all of the possible combinations. Use short cuts whenever and wherever you can in all your figure work, but please do not use them in the practice of any exercises in this course.

Add each figure as you proceed up or down, without hesitation, just as if you were reading. Let the sum of the previous figures be visualized with the next figure to be added (which of course is all done in an instant), and the process continued without hesitation until the entire column is added. Through practice this becomes second nature and eventually addition becomes rapid, accurate, and easy, and you will be able to arrive at the result of a column of figures just as easy as you read a book; that is, without hardly any mental effort and without stopping to think for the result of a certain combi-

nation, because you will be very familiar with all of the combinations, with their results, just the same as you are with the ordinary words of a printed page.

Also, write these columns of figures in lines without changing their order and add them from left to right and backwards. This is very helpful as not all figures you add are found in columns. Alternate your practice of adding the columns and lines.

For example, your first line would be your first column written as follows:

(109) 9 1 7 1 1 9 9 8 2 8 9 6 4 1 1 8 2 5 2 1  
3 8 4 (109).

## LESSON III

### ADDITION—Continued

Many persons will be ambitious to learn to add three figures as well as two at one time *at a glance*.

In the same manner as for Exercise “1,” Exercise “3” following contains in one form all the possible combinations that can be made with three figures, not including the cipher.

The order of the figures in the combinations can be changed so that all the possible combinations of three figures can be practiced in all the various forms in which they may appear. As an illustration, take

3, which combi-	4	5	5	4	3	
4, nation can be	5	4	3	3	and 5	making in all
5, made into	<u>3</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>4</u>	six

different orders of the same combination. Five other orders can, therefore, be made with the figures of each of the three figure combinations in this exercise on a sheet

of paper and practiced, if you are ambitious to do this. However, the exercise as given will probably be of sufficient benefit if faithfully practiced.

[illegible]

## EXERCISE No. 3—Continued

3	3	3	4	4	4	1	4	5	8	3	3	3
3	4	8	1	3	6	4	7	8	2	2	4	8
<u>5</u>	<u>6</u>	<u>1</u>	<u>3</u>	<u>5</u>	<u>8</u>	<u>8</u>	<u>8</u>	<u>8</u>	<u>8</u>	<u>5</u>	<u>7</u>	<u>2</u>
4	4	4	4	5	8	9	3	3	3	3	4	4
2	5	9	8	9	3	4	1	2	3	7	4	8
<u>5</u>	<u>8</u>	<u>3</u>	<u>8</u>	<u>8</u>	<u>8</u>	<u>8</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>2</u>	<u>8</u>	<u>3</u>
1	3	4	6	8	9	4	5	1	3	4	6	1
9	9	9	9	9	9	4	5	1	3	4	6	9
<u>1</u>	<u>3</u>	<u>4</u>	<u>6</u>	<u>8</u>	<u>9</u>	<u>5</u>	<u>5</u>	<u>6</u>	<u>6</u>	<u>6</u>	<u>6</u>	<u>9</u>
3	6	8	1	5	6	7	6	7	9	2	3	4
9	9	9	9	4	5	6	5	6	8	9	9	9
<u>2</u>	<u>5</u>	<u>7</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>6</u>	<u>6</u>	<u>6</u>	<u>9</u>	<u>1</u>	<u>2</u>
5	9	1	7	9	2	3	4	6	8	2	3	6
9	9	8	5	7	9	1	2	4	6	9	9	9
<u>3</u>	<u>7</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>6</u>	<u>6</u>	<u>6</u>	<u>6</u>	<u>6</u>	<u>8</u>	<u>9</u>	<u>3</u>
9	5	2	4	5	7	8	5	2	4	9	1	3
9	2	8	1	2	4	5	3	9	9	9	6	8
<u>6</u>	<u>5</u>	<u>6</u>	<u>6</u>	<u>6</u>	<u>6</u>	<u>6</u>	<u>5</u>	<u>7</u>	<u>9</u>	<u>5</u>	<u>5</u>	<u>5</u>
		4	5	7	9	1	3	4	7	1		
		9	1	3	5	6	8	9	3	9		
		<u>5</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>6</u>	<u>6</u>	<u>6</u>	<u>6</u>	<u>6</u>		



Should you want to take up the practice of columns containing four figures, all such possible combinations in one arrangement or order of figures can be made by adding each of the digits to each of the combinations shown above. Five figure combinations can be made by adding still another digit to each of the combinations of four figures, and so on.

## LESSON IV

---

### ADDITION—Concluded

Many persons become so proficient in addition as to be able to add two short columns of figures at a time. This is just a step further to more rapidity. All the possible two-column combinations of two figures are the figures 10 to 99 inclusive, added to each of themselves, and to each of the other figures from 10 to 99. In other words, any one of the 99 figures from 10 to 99 would be added to itself and to each of the other 88 figures, making in all nearly 10,000 combinations. An exercise of such a number of combinations is of course impracticable for practice in this course, but in Exercise "4" you will find the "cream" of all the possible double column two figure combinations for practice work. There you will find all the possible combinations found in Exercise "1" so arranged as to

cover the principal points of these advanced combinations.

EXERCISE No. 4

<u>11</u>	<u>22</u>	<u>12</u>	<u>33</u>	<u>23</u>	<u>13</u>	<u>44</u>
<u>19</u>	<u>28</u>	<u>29</u>	<u>37</u>	<u>38</u>	<u>39</u>	<u>46</u>
<u>35</u>	<u>25</u>	<u>15</u>	<u>56</u>	<u>46</u>	<u>36</u>	<u>26</u>
<u>57</u>	<u>58</u>	<u>59</u>	<u>65</u>	<u>66</u>	<u>67</u>	<u>68</u>
<u>68</u>	<u>58</u>	<u>48</u>	<u>38</u>	<u>28</u>	<u>18</u>	<u>89</u>
<u>84</u>	<u>85</u>	<u>86</u>	<u>87</u>	<u>88</u>	<u>89</u>	<u>92</u>
<u>81</u>	<u>71</u>	<u>41</u>	<u>51</u>	<u>61</u>	<u>101</u>	<u>21</u>
<u>12</u>	<u>13</u>	<u>16</u>	<u>15</u>	<u>14</u>	<u>29</u>	<u>18</u>
<u>73</u>	<u>63</u>	<u>53</u>	<u>43</u>	<u>103</u>	<u>27</u>	<u>38</u>
<u>33</u>	<u>34</u>	<u>35</u>	<u>36</u>	<u>47</u>	<u>20</u>	<u>30</u>
<u>97</u>	<u>74</u>	<u>84</u>	<u>108</u>	<u>88</u>	<u>72</u>	<u>104</u>
<u>71</u>	<u>17</u>	<u>28</u>	<u>92</u>	<u>82</u>	<u>23</u>	<u>56</u>
<u>99</u>	<u>82</u>	<u>54</u>	<u>95</u>	<u>105</u>	<u>47</u>	<u>76</u>
<u>91</u>	<u>22</u>	<u>45</u>	<u>51</u>	<u>65</u>	<u>14</u>	<u>63</u>
<u>73</u>	<u>38</u>	<u>86</u>	<u>107</u>	<u>39</u>	<u>57</u>	<u>58</u>
<u>70</u>	<u>13</u>	<u>62</u>	<u>83</u>	<u>23</u>	<u>25</u>	<u>35</u>
<u>93</u>	<u>48</u>	<u>76</u>	<u>85</u>	<u>94</u>	<u>59</u>	<u>79</u>
<u>29</u>	<u>24</u>	<u>37</u>	<u>38</u>	<u>39</u>	<u>45</u>	<u>67</u>

## EXERCISE No. 4—Continued

<u>98</u>	<u>78</u>	<u>91</u>	<u>83</u>	<u>106</u>	<u>98</u>	<u>85</u>
<u>79</u>	<u>83</u>	<u>11</u>	<u>32</u>	<u>74</u>	<u>81</u>	<u>52</u>
<u>34</u>	<u>24</u>	<u>14</u>	<u>45</u>	<u>88</u>	<u>97</u>	<u>89</u>
<u>47</u>	<u>48</u>	<u>49</u>	<u>56</u>	<u>68</u>	<u>69</u>	<u>78</u>
<u>16</u>	<u>67</u>	<u>57</u>	<u>47</u>	<u>37</u>	<u>27</u>	<u>17</u>
<u>69</u>	<u>74</u>	<u>75</u>	<u>76</u>	<u>77</u>	<u>78</u>	<u>79</u>
<u>79</u>	<u>69</u>	<u>59</u>	<u>49</u>	<u>39</u>	<u>29</u>	<u>19</u>
<u>93</u>	<u>94</u>	<u>95</u>	<u>96</u>	<u>97</u>	<u>98</u>	<u>99</u>
<u>31</u>	<u>16</u>	<u>102</u>	<u>32</u>	<u>99</u>	<u>42</u>	<u>52</u>
<u>17</u>	<u>10</u>	<u>38</u>	<u>27</u>	<u>89</u>	<u>26</u>	<u>25</u>
<u>62</u>	<u>51</u>	<u>62</u>	<u>49</u>	<u>84</u>	<u>65</u>	<u>95</u>
<u>60</u>	<u>50</u>	<u>24</u>	<u>40</u>	<u>42</u>	<u>54</u>	<u>90</u>
<u>94</u>	<u>55</u>	<u>56</u>	<u>66</u>	<u>87</u>	<u>83</u>	<u>75</u>
<u>41</u>	<u>55</u>	<u>15</u>	<u>64</u>	<u>72</u>	<u>18</u>	<u>27</u>
<u>77</u>	<u>92</u>	<u>66</u>	<u>109</u>	<u>49</u>	<u>91</u>	<u>64</u>
<u>73</u>	<u>19</u>	<u>26</u>	<u>11</u>	<u>34</u>	<u>21</u>	<u>44</u>
<u>67</u>	<u>93</u>	<u>74</u>	<u>75</u>	<u>84</u>	<u>29</u>	<u>96</u>
<u>36</u>	<u>31</u>	<u>43</u>	<u>53</u>	<u>80</u>	<u>12</u>	<u>61</u>

## EXERCISE No. 4—Continued

96	87	78	69	95	86	77
<u>59</u>	<u>58</u>	<u>57</u>	<u>56</u>	<u>49</u>	<u>48</u>	<u>47</u>
65	68					
<u>16</u>	<u>46</u>					

Double columns of three, four or more figures can be made for practice, if desired, and it is suggested, that the combinations in Exercise No. 3 be used for three figure double column exercises.

## LESSON V

---

### SUBTRACTION

$$\text{TERMS} \left\{ \begin{array}{l} 7 \text{ Minuend} \\ 3 \text{ Subtrahend} \\ \overline{4} \text{ Remainder or Difference.} \end{array} \right.$$

In Exercise No. 5 you will find all the possible basic combinations of subtraction, both in subtracting a lesser from a greater number, and also in subtracting a greater digit from a lesser digit increased 10 units by "borrowing."

Practice these exercises until you can give the remainder of each at a glance, with ease, and without error. Then it is only a matter of continued systematic practice until the desired rapidity is attained.

To prove subtraction, the sum of the remainder and the subtrahend must equal the minuend.



## SUBTRACTION

31

## EXERCISE No. 5

<u>7</u>	<u>9</u>	<u>14</u>	<u>6</u>	<u>8</u>	<u>7</u>	<u>7</u>	<u>4</u>	<u>11</u>	<u>15</u>
<u>2</u>	<u>3</u>	<u>9</u>	<u>2</u>	<u>6</u>	<u>4</u>	<u>7</u>	<u>3</u>	<u>2</u>	<u>7</u>
<u>13</u>	<u>10</u>	<u>1</u>	<u>3</u>	<u>5</u>	<u>12</u>	<u>5</u>	<u>9</u>	<u>10</u>	<u>16</u>
<u>6</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>9</u>	<u>1</u>	<u>4</u>	<u>4</u>	<u>9</u>
<u>10</u>	<u>13</u>	<u>15</u>	<u>12</u>	<u>18</u>	<u>6</u>	<u>4</u>	<u>3</u>	<u>7</u>	<u>8</u>
<u>3</u>	<u>5</u>	<u>8</u>	<u>6</u>	<u>9</u>	<u>3</u>	<u>2</u>	<u>3</u>	<u>6</u>	<u>4</u>
<u>13</u>	<u>2</u>	<u>6</u>	<u>8</u>	<u>9</u>	<u>17</u>	<u>9</u>	<u>10</u>	<u>17</u>	<u>9</u>
<u>8</u>	<u>1</u>	<u>6</u>	<u>3</u>	<u>2</u>	<u>9</u>	<u>0</u>	<u>5</u>	<u>8</u>	<u>1</u>
<u>9</u>	<u>2</u>	<u>10</u>	<u>7</u>	<u>4</u>	<u>5</u>	<u>8</u>	<u>11</u>	<u>12</u>	<u>16</u>
<u>5</u>	<u>2</u>	<u>9</u>	<u>5</u>	<u>1</u>	<u>0</u>	<u>2</u>	<u>3</u>	<u>5</u>	<u>7</u>
<u>10</u>	<u>7</u>	<u>14</u>	<u>5</u>	<u>2</u>	<u>4</u>	<u>9</u>	<u>6</u>	<u>10</u>	<u>15</u>
<u>1</u>	<u>3</u>	<u>5</u>	<u>2</u>	<u>0</u>	<u>4</u>	<u>7</u>	<u>1</u>	<u>2</u>	<u>9</u>
<u>13</u>	<u>4</u>	<u>8</u>	<u>11</u>	<u>1</u>	<u>9</u>	<u>8</u>	<u>7</u>	<u>14</u>	<u>12</u>
<u>9</u>	<u>0</u>	<u>8</u>	<u>8</u>	<u>0</u>	<u>9</u>	<u>5</u>	<u>1</u>	<u>6</u>	<u>8</u>
<u>11</u>	<u>12</u>	<u>10</u>	<u>5</u>	<u>6</u>	<u>9</u>	<u>7</u>	<u>16</u>	<u>3</u>	<u>8</u>
<u>9</u>	<u>3</u>	<u>8</u>	<u>5</u>	<u>4</u>	<u>6</u>	<u>0</u>	<u>8</u>	<u>1</u>	<u>0</u>
<u>13</u>	<u>11</u>	<u>3</u>	<u>5</u>	<u>10</u>	<u>6</u>	<u>11</u>	<u>8</u>	<u>8</u>	<u>6</u>
<u>4</u>	<u>5</u>	<u>0</u>	<u>4</u>	<u>7</u>	<u>5</u>	<u>7</u>	<u>7</u>	<u>1</u>	<u>0</u>
<u>15</u>	<u>12</u>	<u>14</u>	<u>11</u>	<u>11</u>	<u>13</u>	<u>9</u>	<u>10</u>	<u>12</u>	<u>14</u>
<u>6</u>	<u>4</u>	<u>7</u>	<u>6</u>	<u>4</u>	<u>7</u>	<u>8</u>	<u>6</u>	<u>7</u>	<u>8</u>

## LESSON VI

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### SUBTRACTION—Continued

As a supplement to Lesson No. V, Exercise “6” furnishes practical examples of subtraction and at the same time gives excellent practice in such a way as to cover all the BASIC forms of subtraction, **WITHOUT DUPLICATION**; thereby giving a maximum amount of benefit from a minimum amount of effort.

In the operation of subtraction, when a greater number is to be taken from a lesser figure, it becomes necessary to take or borrow “1” or 10 units from the next preceding figure of the minuend. All possible combinations resulting from this operation are included in the arrangement of these exercises. Both the taking-away and the making-up methods may be used in the practice of these exercises.

## SUBTRACTION

33

## EXERCISE No. 6

91	57	76	93	86	74	95	69	46
<u>90</u>	<u>32</u>	<u>43</u>	<u>72</u>	<u>44</u>	<u>61</u>	<u>54</u>	<u>15</u>	<u>40</u>

19	58	65	29	94	37	82	38	47
<u>10</u>	<u>23</u>	<u>51</u>	<u>11</u>	<u>63</u>	<u>30</u>	<u>80</u>	<u>21</u>	<u>31</u>

73	87	99	49	75	98	78	59	84
<u>70</u>	<u>35</u>	<u>18</u>	<u>13</u>	<u>52</u>	<u>27</u>	<u>25</u>	<u>14</u>	<u>62</u>

89	64	92	88	79	56	97	28	66
<u>17</u>	<u>60</u>	<u>81</u>	<u>26</u>	<u>16</u>	<u>41</u>	<u>36</u>	<u>20</u>	<u>42</u>

96	39	85	68	55	83	48	67	77
<u>45</u>	<u>12</u>	<u>53</u>	<u>24</u>	<u>50</u>	<u>71</u>	<u>22</u>	<u>33</u>	<u>34</u>

207	390	516	962	2200	645	302
<u>037</u>	<u>293</u>	<u>347</u>	<u>288</u>	<u>1202</u>	<u>159</u>	<u>082</u>

910	536	6001	503	480	714	833
<u>819</u>	<u>149</u>	<u>0901</u>	<u>073</u>	<u>384</u>	<u>565</u>	<u>476</u>

952	1021	1031	942	912	813	427
<u>387</u>	<u>793</u>	<u>694</u>	<u>486</u>	<u>783</u>	<u>674</u>	<u>139</u>

863	640	1061	318	760	922	744
<u>179</u>	<u>546</u>	<u>397</u>	<u>129</u>	<u>667</u>	<u>684</u>	<u>268</u>

734	1008	823	615	724	1081	972
<u>367</u>	<u>048</u>	<u>575</u>	<u>456</u>	<u>466</u>	<u>199</u>	<u>189</u>

## EXERCISE No. 6—Continued

570	625	932	1071	754	404
<u>475</u>	<u>357</u>	<u>585</u>	<u>298</u>	<u>169</u>	<u>064</u>
417	1030	1051	850	1011	709
<u>238</u>	<u>931</u>	<u>0496</u>	<u>758</u>	<u>892</u>	<u>059</u>
905	1041	853	635	843	806
<u>015</u>	<u>595</u>	<u>278</u>	<u>258</u>	<u>377</u>	<u>026</u>
526					
<u>248</u>					

## LESSON VII

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### SUBTRACTION—Concluded

The *making-up* method as a process of subtraction is of valuable use in the making of change, not only to the cashier or clerk, but to the purchaser as well, in order to quickly check up the amount of the change handed to him, for no doubt nearly every one has experienced a loss through the unintentional mistake of a clerk.

Instead of taking away a certain number from another one, by the making-up method you add to the number usually taken away the figure or figures which make up the difference to the whole number.

For instance, as in “making change,” suppose an article costs you 23 cents and you hand the clerk a 25 cent piece. Your change would be 2 cents because 23 plus 2 equals 25. Or, say you gave a

\$1. note, the difference due would be 77 cents and your change should total that amount.

In another way you would not have to count your change to see if you had 77 cents, but in making the change you would say "23 (as the cost price), 25, 50, \$1.00," by handing out respectively 2 cents, a 25 cent piece, and a 50 cent piece. Whatever the value of the coins were you would add the represented amount of each coin as you passed them out or they were handed over to you.

The combinations in this lesson contain practically every combination of importance in the "making change" method, and a thorough familiarity with them will add greatly to your ability to calculate rapidly, as well as counting your change or making it promptly and accurately.

Practice these combinations both by giving the full amount required to make up the difference between the figure given and the total, and also by "making change." For instance, in 61 plus?



equals 70; first, give your answer as "9"; second, give your answer as "61, 65, 70," while mentally adding respectively 4 cents and 5 cents. Where there is a greater difference more change of course is involved in the "making-up."

## EXERCISE No. 7

1+	=5	30+	=35
31+	=35	56+	=65
57+	=65	81+	=85
82+	=85	1+	=10
2+	=10	31+	=40
32+	=40	61+	=65
62+	=65	87+	=95
88+	=95	6+	=10
7+	=10	36+	=40
37+	=40	62+	=70
63+	=70	92+	=95
93+	=95	12+	=15
13+	=15	37+	=45
38+	=45	67+	=70
68+	=70	53+	=75
54+	=75	13+	=20
14+	=20	42+	=45
43+	=45	73+	=80
74+	=80	58+	=75
59+	=75	18+	=20
19+	=20	48+	=55
49+	=55	78+	=80

## EXERCISE No. 7—Continued

79+	=80	63+	=75
64+	=75	24+	=30
25+	=30	53+	=55
54+	=55	84+	=90
85+	=90	68+	=75
69+	=75	29+	=30
26+	=35	54+	=60
55+	=60	89+	=90
76+	=85	73+	=75
74+	=75	58+	=60
59+	=60	79+	=85
80+	=85	3+	=5
4+	=5	33+	=35
34+	=35	59+	=65
60+	=65	84+	=85
86+	=95	4+	=10
5+	=10	34+	=40
35+	=40	64+	=65
61+	=70	90+	=95
91+	=95	9+	=10
11+	=15	39+	=40
36+	=45	65+	=70
66+	=70	51+	=75
52+	=75	11+	=20
12+	=20	40+	=45
41+	=45	71+	=80
72+	=80	56+	=75
57+	=75	16+	=20
17+	=20	46+	=55

## EXERCISE No. 7—Continued

47+	=55	76+	=80
77+	=80	61+	=75
62+	=75	22+	=30
23+	=30	51+	=55
52+	=55	82+	=90
83+	=90	66+	=75
67+	=75	27+	=30
28+	=30	52+	=60
53+	=60	87+	=90
88+	=90	71+	=75
72+	=75	28+	=35
29+	=35	57+	=60
78+	=85	77+	=85
2+	=5	55+	=75
32+	=35	15+	=20
58+	=65	44+	=45
83+	=85	75+	=80
3+	=10	60+	=75
33+	=40	21+	=30
63+	=65	50+	=55
89+	=95	81+	=90
8+	=10	65+	=75
38+	=40	26+	=30
64+	=70	51+	=60
94+	=95	86+	=90
14+	=15	70+	=75
39+	=45	27+	=35
69+	=70	56+	=60

In addition to the combinations given above, the following combinations should be written out and also practiced, as the above list is not complete without them:

Twenty-four combinations, from 1 plus ? equals 25, up to 24 plus ? equals 25. Fifty combinations, from 1 plus ? equals 50, up to 49 plus ? equals 50. One hundred combinations, from 1 plus ? equals 100, up to 99 plus ? equals 100.

These combinations will then cover every item of change in denominations of \$1.00 and below and naturally cover fractions of a dollar above one dollar.

## LESSON VIII

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### MULTIPLICATION

$$\text{TERMS} \left\{ \begin{array}{l} 15 \text{ Multiplicand} \\ 7 \text{ Multiplier} \\ \hline 105 \text{ Product} \end{array} \right.$$

The multiplication table is taught in all schools to such an extent that practically every one should be able to repeat it accurately and without hesitation. If you cannot do this it is suggested that you again familiarize yourself with it. Then continue with Exercise "8" which contains all the combinations that are found in the multiplication table up to and including the 9th table.

In a problem requiring the multiplication of figures progressively, there is, when the product is greater than 9, a figure to carry over and to be added to the product of the next combination.

To explain; let us take the example  $527 \times 8$ . The first operation is  $8 \times 7$  equal-

ling 56. The "6" is set down as a figure in the product and the "5" is carried over to be added to the product of  $8 \times 2$ , which plus the "5" carried over makes a total of 21. The "1" of this result is placed in its proper place in the answer and the "2" is carried over to be added to the product of  $8 \times 5$ , or 40, making 42, which figures are placed in the answer.

If you have mastered the multiplication table, you should have no difficulty in giving the products of all the possible multiplication combinations, but you may feel that you do not add to the subsequent product the amount carried over, as rapidly as you desire.

To overcome this little difficulty the combinations in Exercise "8" are arranged so that all the figures which are possible to be carried over and added to the respective products in the operation of the first nine multiplication tables, will be given.

The faithful systematic practice of these combinations should naturally develop any person's ability to multiply



with remarkable ease, accuracy and rapidity.

## EXERCISE No. 8

$9 \times 2 + 2$	$2 \times 4 + 1$	$9 \times 1 + 1$
$9 \times 9 + 7$	$8 \times 9 + 3$	$2 \times 3 + 1$
$8 \times 6 + 6$	$9 \times 7 + 7$	$9 \times 5 + 5$
$9 \times 1 + 4$	$7 \times 1 + 1$	$3 \times 4 + 1$
$7 \times 4 + 5$	$9 \times 6 + 7$	$9 \times 1 + 6$
$9 \times 6 + 6$	$6 \times 4 + 4$	$3 \times 8 + 2$
$6 \times 3 + 3$	$9 \times 8 + 8$	$9 \times 5 + 8$
$9 \times 9 + 8$	$5 \times 2 + 2$	$4 \times 2 + 2$
$5 \times 7 + 1$	$9 \times 3 + 4$	$9 \times 9 + 1$
$9 \times 1 + 3$	$2 \times 2 + 1$	$4 \times 5 + 3$
$4 \times 8 + 2$	$9 \times 1 + 8$	$9 \times 1 + 2$
$9 \times 2 + 3$	$3 \times 3 + 2$	$5 \times 3 + 4$
$3 \times 5 + 1$	$9 \times 7 + 8$	$9 \times 3 + 5$
$9 \times 3 + 3$	$3 \times 8 + 1$	$6 \times 1 + 1$
$2 \times 1 + 1$	$9 \times 6 + 8$	$9 \times 9 + 2$
$3 \times 3 + 1$	$6 \times 8 + 5$	$4 \times 6 + 3$
$4 \times 1 + 3$	$3 \times 4 + 2$	$5 \times 2 + 3$
$8 \times 8 + 7$	$4 \times 4 + 3$	$3 \times 5 + 2$
$7 \times 6 + 6$	$8 \times 1 + 1$	$8 \times 9 + 1$
$5 \times 1 + 4$	$7 \times 7 + 6$	$5 \times 5 + 2$
$7 \times 3 + 3$	$6 \times 6 + 5$	$8 \times 9 + 2$
$4 \times 2 + 3$	$5 \times 1 + 1$	$5 \times 5 + 1$
$8 \times 8 + 1$	$8 \times 9 + 7$	$8 \times 2 + 2$
$4 \times 9 + 3$	$7 \times 4 + 4$	$5 \times 1 + 2$
$3 \times 9 + 1$	$6 \times 1 + 5$	$8 \times 3 + 6$
$8 \times 9 + 6$	$8 \times 8 + 6$	$6 \times 7 + 1$
$7 \times 8 + 5$	$7 \times 4 + 6$	$4 \times 6 + 1$

## EXERCISE No. 8—Continued

$5 \times 3 + 3$	$4 \times 4 + 1$	$7 \times 2 + 2$
$6 \times 2 + 4$	$5 \times 5 + 3$	$8 \times 9 + 4$
$8 \times 9 + 5$	$8 \times 1 + 7$	$5 \times 6 + 2$
$8 \times 3 + 7$	$8 \times 4 + 6$	$8 \times 8 + 2$
$6 \times 5 + 5$	$7 \times 1 + 2$	$3 \times 9 + 2$
$8 \times 4 + 4$	$8 \times 5 + 5$	$8 \times 1 + 6$
$4 \times 3 + 3$	$6 \times 6 + 1$	$6 \times 3 + 4$
$6 \times 9 + 1$	$4 \times 6 + 2$	$8 \times 8 + 3$
$6 \times 7 + 3$	$8 \times 2 + 6$	$7 \times 3 + 6$
$8 \times 2 + 5$	$7 \times 3 + 5$	$6 \times 7 + 5$
$7 \times 3 + 4$	$6 \times 7 + 4$	$7 \times 9 + 3$
$5 \times 7 + 3$	$7 \times 9 + 2$	$7 \times 7 + 5$
$6 \times 8 + 1$	$5 \times 8 + 1$	$5 \times 8 + 2$
$5 \times 2 + 4$	$2 \times 5 + 1$	$9 \times 9 + 6$
$9 \times 9 + 3$	$4 \times 9 + 1$	$3 \times 1 + 1$
$4 \times 4 + 2$	$9 \times 9 + 4$	$4 \times 5 + 2$
$7 \times 9 + 6$	$4 \times 7 + 1$	$7 \times 9 + 5$
$4 \times 5 + 1$	$2 \times 6 + 1$	$9 \times 9 + 5$
$9 \times 5 + 6$	$7 \times 9 + 1$	$3 \times 6 + 2$
$4 \times 7 + 3$	$9 \times 5 + 7$	$5 \times 8 + 4$
$9 \times 4 + 5$	$4 \times 8 + 3$	$9 \times 4 + 4$
$5 \times 4 + 4$	$9 \times 4 + 6$	$4 \times 8 + 1$
$6 \times 1 + 2$	$8 \times 5 + 6$	$9 \times 4 + 7$
$8 \times 4 + 5$	$2 \times 7 + 1$	$3 \times 1 + 2$
$9 \times 4 + 8$	$8 \times 6 + 7$	$6 \times 2 + 3$
$3 \times 6 + 1$	$9 \times 3 + 6$	$8 \times 4 + 7$
$5 \times 5 + 4$	$7 \times 1 + 4$	$9 \times 3 + 7$
$4 \times 7 + 2$	$2 \times 8 + 1$	$5 \times 7 + 4$
$9 \times 3 + 8$	$6 \times 1 + 4$	$7 \times 1 + 3$

## EXERCISE No. 8—Continued

$8 \times 8 + 4$	$9 \times 2 + 5$	$5 \times 6 + 1$
$5 \times 6 + 4$	$7 \times 1 + 5$	$9 \times 2 + 6$
$6 \times 1 + 3$	$8 \times 3 + 3$	$3 \times 2 + 2$
$8 \times 5 + 7$	$2 \times 9 + 1$	$6 \times 2 + 2$
$9 \times 2 + 7$	$7 \times 1 + 6$	$4 \times 9 + 2$
$3 \times 7 + 1$	$9 \times 1 + 5$	$7 \times 8 + 6$
$5 \times 9 + 4$	$7 \times 2 + 4$	$9 \times 2 + 8$
$7 \times 8 + 1$	$8 \times 7 + 7$	$3 \times 7 + 2$
$4 \times 1 + 1$	$7 \times 2 + 6$	$7 \times 8 + 3$
$7 \times 2 + 3$	$8 \times 1 + 2$	$5 \times 7 + 2$
$8 \times 8 + 5$	$5 \times 6 + 3$	$6 \times 2 + 5$
$9 \times 1 + 7$	$8 \times 3 + 4$	$4 \times 1 + 2$
$5 \times 1 + 3$	$6 \times 3 + 5$	$5 \times 9 + 2$
$7 \times 8 + 2$	$7 \times 7 + 2$	$8 \times 2 + 3$
$6 \times 6 + 3$	$8 \times 3 + 5$	$6 \times 6 + 2$
$8 \times 1 + 3$	$6 \times 9 + 3$	$7 \times 8 + 4$
$6 \times 7 + 2$	$7 \times 9 + 4$	$8 \times 2 + 4$
$7 \times 7 + 1$	$8 \times 1 + 5$	$6 \times 4 + 5$
$8 \times 1 + 4$	$6 \times 6 + 4$	$7 \times 2 + 5$
$6 \times 8 + 2$	$6 \times 8 + 4$	$7 \times 7 + 3$
$7 \times 5 + 5$	$5 \times 9 + 1$	$6 \times 9 + 4$
$8 \times 2 + 7$	$7 \times 5 + 6$	$9 \times 2 + 4$
$6 \times 8 + 3$	$6 \times 9 + 2$	$7 \times 7 + 4$
$5 \times 8 + 3$	$5 \times 9 + 3$	$6 \times 9 + 5$

## LESSON IX

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### MULTIPLICATION—Concluded

For those who desire a further and more practical application of the combinations in Exercise “8,” the following exercises are arranged so that all the possible combinations shown in Lesson VIII come into the process of multiplying in those exercises.

Multiply each set of figures by each of the digits from 2 to 9 respectively, multiplying oftener with the most difficult digit. These exercises can be used as the multiplicand for figures higher than 9, although such practice would not contain all the combinations resulting from using those figures, as these exercises are arranged only for use with the digits.

#### EXERCISE No. 9

911	812	713	614	515	416
<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>

## EXERCISE No. 9—Continued

823	724	625	526	427	328
<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>
735	636	537	438	339	603
<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>
647	548	449	704	451	352
<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>
559	405	561	462	363	264
<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>
671	572	473	374	275	176
<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>
583	484	385	286	187	988
<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>
495	396	297	198	999	309
<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>
317	218	119	801	121	922
<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>
229	902	231	132	933	834
<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>
341	242	143	944	845	746
<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>

## EXERCISE No. 9—Concluded

253	154	955	856	757	658
<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>
165	966	867	768	669	506
<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>
977	878	779	107	781	682
<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>
889	208	891	792	693	594
<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>
110	220	330	440	550	660
<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>
	770	880	990		
	<u>x</u>	<u>x</u>	<u>x</u>		

Eight sets of these figures may be written and each of the digits placed as the multiplier for each set, thereby making a complete set of exercises for each digit always at hand for instant practice.



## LESSON X

### DIVISION

$$\text{TERMS } \left\{ \begin{array}{l} \text{Divisor } 3 \overline{)963} \text{ Dividend} \\ \text{Quotient } 321 \end{array} \right.$$

Division by the short or mental method is generally done up to including the figure 12 as the divisor. From 13 up the long division method is generally used, although some persons do use the short method for some figures higher than 12, and should when such division is frequently used in one's line of work.

The long division method involves principally the processes of multiplication and subtraction, and, therefore, proficiency in multiplication and subtraction will also insure proficiency in long division.

In short division the multiplication table itself comes into the work, and also the process of subtraction where the dividend is greater than the product of the divisor

and the respective figure of the quotient. For instance, in the example  $9 \overline{)79}$ , the largest divisible product is that of the quotient 8 times the divisor 9, or 72, which subtracted from 79 leaves a remainder of 7. All such possible basic divisible combinations are to be found in Exercise No. 10.

To prove division, multiply the divisor by the quotient, adding the remainder, if any, which result should equal the dividend.

### EXERCISE No. 10

*Scheme.*

Divide	2	into	all the fig. from				2	to	19	incl.
"	3	"	"	"	"	"	3	"	29	"
"	4	"	"	"	"	"	4	"	39	"
"	5	"	"	"	"	"	5	"	49	"
"	6	"	"	"	"	"	6	"	59	"
"	7	"	"	"	"	"	7	"	69	"
"	8	"	"	"	"	"	8	"	79	"
"	9	"	"	"	"	"	9	"	89	"
"	10	"	"	"	"	"	10	"	99	"
"	11	"	"	"	"	"	11	"	109	"
"	12	"	"	"	"	"	12	"	119	"
	<u>)10</u>		<u>)20</u>		<u>)30</u>		<u>)40</u>		<u>)50</u>	
	<u>)11</u>		<u>)21</u>		<u>)31</u>		<u>)41</u>		<u>)51</u>	
<u>)2</u>	<u>)12</u>		<u>)22</u>		<u>)32</u>		<u>)42</u>		<u>)52</u>	

## EXERCISE No. 10—Continued

<u>)3</u>	<u>)13</u>	<u>)23</u>	<u>)33</u>	<u>)43</u>	<u>)53</u>
<u>)4</u>	<u>)14</u>	<u>)24</u>	<u>)34</u>	<u>)44</u>	<u>)54</u>
<u>)5</u>	<u>)15</u>	<u>)25</u>	<u>)35</u>	<u>)45</u>	<u>)55</u>
<u>)6</u>	<u>)16</u>	<u>)26</u>	<u>)36</u>	<u>)46</u>	<u>)56</u>
<u>)7</u>	<u>)17</u>	<u>)27</u>	<u>)37</u>	<u>)47</u>	<u>)57</u>
<u>)8</u>	<u>)18</u>	<u>)28</u>	<u>)38</u>	<u>)48</u>	<u>)58</u>
<u>)9</u>	<u>)19</u>	<u>)29</u>	<u>)39</u>	<u>)49</u>	<u>)59</u>
<hr/>					
<u>)60</u>	<u>)70</u>	<u>)80</u>	<u>)90</u>	<u>)100</u>	<u>)110</u>
<u>)61</u>	<u>)71</u>	<u>)81</u>	<u>)91</u>	<u>)101</u>	<u>)111</u>
<u>)62</u>	<u>)72</u>	<u>)82</u>	<u>)92</u>	<u>)102</u>	<u>)112</u>
<u>)63</u>	<u>)73</u>	<u>)83</u>	<u>)93</u>	<u>)103</u>	<u>)113</u>
<u>)64</u>	<u>)74</u>	<u>)84</u>	<u>)94</u>	<u>)104</u>	<u>)114</u>
<u>)65</u>	<u>)75</u>	<u>)85</u>	<u>)95</u>	<u>)105</u>	<u>)115</u>
<u>)66</u>	<u>)76</u>	<u>)86</u>	<u>)96</u>	<u>)106</u>	<u>)116</u>

## EXERCISE No. 10—Continued

<u>)67</u>	<u>)77</u>	<u>)87</u>	<u>)97</u>	<u>)107</u>	<u>)117</u>
<u>)68</u>	<u>)78</u>	<u>)88</u>	<u>)98</u>	<u>)108</u>	<u>)118</u>
<u>)69</u>	<u>)79</u>	<u>)89</u>	<u>)99</u>	<u>)109</u>	<u>)119</u>

## LESSON XI

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### PERCENTAGE

Your next and last task now is to take up the practice of short cuts, and also the compilation and practice of any special combinations used in your figure work and which will be of help to you. This will put the finishing touches on your ability to calculate to the highest degree of rapidity, accuracy, and ease in your particular line of work.

As short cut methods are generally explained in advanced arithmetic books and in numerous other works on the subject, which can be obtained at almost any good book store or probably in school, there is no need to refer to or describe any of the methods in this course.

If your figure work is, or will be, of a special character, all the possible fundamental or basic combinations which enter into it should be worked out and gathered

together into an exercise and practiced, and soon you will find that such combinations are handled with ease and become "second nature" just as the basic combinations of this course should be at the "tip of your tongue" always at your command.

Practically every kind of business, trade, or profession, has a special characteristic method of figuring applicable to that particular kind of business, but this does not in any way affect the functions of addition, subtraction, multiplication and division.

The various methods of figuring used in different kinds of businesses are too numerous to give any attention to them here, but as you now understand the method of this course, you should be able to make up exercises of all the principal and basic combinations that you constantly use in your particular figure work, and which you feel you should be more familiar with.

As an illustration, let us assume that it is essential for you to know and use per-

centages and their equivalents in common fractions. We will then prepare a memorandum about as follows:

$$\text{TERMS: } \left\{ \begin{array}{ll} \text{Numerator} & 2 \\ \text{Denominator} & 3 \end{array} \right.$$

To find the equivalent of a fraction in percentage, divide the denominator into the numerator after a decimal and two ciphers have been added to the numerator, and the result will be the terms of the fraction expressed in percent; as,

$$\frac{3}{4} = \frac{4 \overline{)3.00}}{.75 \text{ or } 75\%}$$

To change a percentage into a fraction, the figures of the percent represent the numerator and 100 equals the denominator: as

$$75\% \text{ equals } \frac{75}{100} \text{ which reduced equals } \frac{3}{4}$$

The following are the most common fractions and percentages used, and they should be learned so that they are—so to speak—at the “tip of your tongue.”



## EXERCISE No. 11

$1/50$ — $2\%$	$5/16$ — $31-1/4\%$
$1/40$ — $2-1/2\%$	$1/3$ — $33-1/3\%$
$1/32$ — $3-1/8\%$	$3/8$ — $37-1/2\%$
$1/25$ — $4\%$	$2/5$ — $40\%$
$1/20$ — $5\%$	$7/16$ — $43-3/4\%$
$1/16$ — $6-1/4\%$	$1/2$ — $50\%$
$1/15$ — $6-2/3\%$	$9/16$ — $56-1/4\%$
$1/12$ — $8-1/3\%$	$3/5$ — $60\%$
$1/10$ — $10\%$	$5/8$ — $62-1/2\%$
$1/9$ — $11-1/9\%$	$2/3$ — $66-2/3\%$
$1/8$ — $12-1/2\%$	$11/16$ — $68-3/4\%$
$1/7$ — $14-2/7\%$	$3/4$ — $75\%$
$1/6$ — $16-2/3\%$	$4/5$ — $80\%$
$3/16$ — $18-3/4\%$	$5/6$ — $83-1/3\%$
$1/5$ — $20\%$	$13/16$ — $81-1/4\%$
$1/4$ — $25\%$	$7/8$ — $87-1/2\%$
	$15/16$ — $93-3/4\%$

Combinations for figuring interest, and many other classes of figuring can be worked out to advantage, and little practice in at least the frequent combinations will develop your ability more than you can realize at the moment.

## CONCLUSION

I want to emphasize again the importance of mastering these fundamental combinations as all further arithmetical calculations are only progressive steps of these basic combinations. They are very closely related, subtraction being the inverse of addition, and short division the inverse of multiplication, etc.

Review these exercises daily, if possible, and if you find you are not quite as proficient in some of the combinations, you should give more attention to them so that your proficiency in ALL the foregoing combinations will be one hundred percent.

Naturally, the more application you give to the exercises of this course, the more developed will be your ability. Even after you have finished the course you will sometimes want to review occasionally in order to keep in trim, just as the pianist practices finger exercises in order to keep on playing well.

Of course you want to develop your

ability to handle figures to the highest possible degree of rapidity and accuracy, and the quickest and easiest way to the acquirement of this ability is the continued practice of these basic combinations. There is no "Royal Road to Success" in figures nor in any other worthy attainment. Also remember that the man with the large earning capacity is the one that can do his work accurately and quickly, and with such ease as to consider it like playing.

The Combinations in Exercises 2, 4, 6, and 9 are not to be memorized, as they are arranged solely for giving practice in the basic combinations, but the **RESPECTIVE BASIC COMBINATIONS SHOULD BE KEPT CONSTANTLY IN MIND IN THE PRACTICE OF THESE EXERCISES.**

Exercises 1, 3, 5, 7, 8, 10 and 11, which contain the basic combinations, will become memorized or firmly fixed in the mind after sufficient practice.

Briefly, I want to suggest again; go slow at first in giving the sum of each

combination, in order to be sure you are accurate, and endeavor to pass from one combination to another in like manner as you would pass from word to word in a sentence; that is, without hesitation. Learn each basic combination so that its sum can be given immediately—at a glance. Also “think out” what makes the answer you arrive at. Alternate this method of reading by skipping from one combination to another without following the present order of the combinations, and also orally with the help of an assistant as mentioned in the general suggestions.



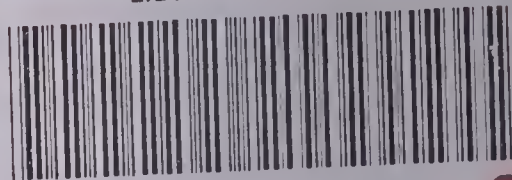








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